Pea

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Specific Name and Introduction: There are three types of edible peas (*Pisum sativum* L.), from the family Fabaceae (also called Leguminosae). The most common is the garden or green pea *P. sativum* var. *sativum* L. This pea has a tough pod, which is discarded prior to eating (Basterrechea and Hicks, 1991; Snowden, 1991). Most often these peas are frozen or processed. The success of the frozen pea industry in the U.S. has resulted in a decline in the sale of peas sold in the pods (Basterrechea and Hicks, 1991). The other two types of peas have soft, edible pods and belong to the subspecies *P. sativum* var. *macrocarpon* Ser. The snow or sugar pea has a flat pod with minimal development of the seeds, while the sugar snap pea or snap pea has well developed seeds and is fully rounded (Hocking, 1997; Suslow and Cantwell, 1998). The sugar snap pea is the result of a cross between the snow pea and an unusual tightly podded pea with thick walls. All these peas grow best under cool, moist conditions.

Quality Characteristics and Criteria: Good quality peas should be uniformly bright green, fully turgid and free from defects and mechanical damage. Stems and calyxes should be green. Green peas lose sugars and flavor rapidly after harvest unless they are promptly cooled to 0 °C (32 °F).

Grades, Sizes and Packaging: Grades include U.S. No. 1 and U.S. Fancy based primarily on external appearance. They should exhibit similar varietal characteristics which are not overmature or excessively small, not badly misshapen or watersoaked, and fairly well filled, fresh, free from decay, and from damage caused by black calyxes, freezing, splitting, hail, dirt, leaves, or other foreign mater, mildew, or other diseases, insects, or mechanical or other means. There are no USDA Grades for snow or snap peas, but best quality snow peas are 7.6 to 9 cm (3 to 3.5 in) long and 1.9 cm (0.75 in) wide, while snap peas should be 6.4 to 7.6 cm (2.5 to 3 in) long. Green peas are shipped in 13.6 kg (30 lb) bushel baskets, or crates. Snow and sugar snap peas are shipped in 4.5 kg (10 lb) cartons.

Harvest Maturity Indices: For best quality, both edible podded peas and green peas should be harvested before physiological maturity, ie., before peas deform the hull (Basterrechea and Hicks, 1991). Snow peas should be harvested when the pods are maximum size but before any visible seed development; frequent harvesting is necessary. Sugar snap peas should be harvested after they have developed seeds, similar to garden peas (Hocking, 1997).

Pre-cooling Conditions: Peas must be promptly pre-cooled after harvest by forced-air cooling, hydro-cooling or vacuum-cooling. If vacuum-cooling is used it is important that the peas are pre-wet to ensure rapid cooling (Ryall and Lipton, 1979). Forced-air cooling is the preferred method of cooling for edible podded peas (NWREC, 1998).

Optimum Storage Conditions: All three types of peas can be stored for 1 to 2 weeks at 0 °C (32 °F) with 95 to 98% RH (Wager, 1964; Suslow and Cantwell, 1998). Garden peas store better unshelled than shelled, possibly because shelling damages the peas (Basterrechea and Hicks, 1991). If there is surface moisture on peas, it is essential that they be stored below 2 °C (35.6 °F).

Controlled Atmosphere (CA) Considerations: Little work has been done on CA storage of peas. Green pea quality was maintained better for 20 days in 5 to 7% CO_2 at 0 °C (32 °F) than in air (Tomkins, 1957).

Snow and snap peas respond moderately to CA of 2 to 3% O_2 + 2 to 3% CO_2, although not all research has found CA to be beneficial (Suslow and Cantwell, 1998).

Retail Outlet Display Considerations: Storage with crushed ice can be beneficial, and water sprays are acceptable for garden and snow peas, but these should be avoided for snap peas (Suslow and Cantwell, 1998).

Chilling Sensitivity: Peas are not sensitive to low temperature and should be stored as close to 0 °C (32 °F) as possible without freezing.

Ethylene Production and Sensitivity: Peas produce very low levels of ethylene at < 0.1 μL kg^{-1} h^{-1} at 20 °C (68 °F). However, they are moderately sensitive to ethylene after harvest, which results in yellowing and increased decay. The calyx is more sensitive to ethylene than the pod (Suslow and Cantwell, 1998).

Respiration Rates:

Temperature	Garden Peas	Edible-pod peas (estimate)
	(mg CO_2 kg^{-1} h^{-1})	
0 °C	30 to 46	30 to 48
5 °C	55 to 72	53 to 74
10 °C	63 to 108	65 to 112
15 °C	165 to 185	165 to 187
20 °C	220 to 322	221 to 324
25 °C	298 to 327	-

To get mL kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day. Data are from ASHRAE (1985) and Suslow and Cantwell (1998).

Physiological Disorders: Freezing may start at -0.6 °C (30.9 °F). Freezing causes water soaked areas followed by rapid decay from soft rot bacteria (Suslow and Cantwell, 1998). Edible podded peas are susceptible to premature senescence resulting in yellowing, color changes in the calyx and loss of tenderness and flavor (Suslow and Cantwell, 1998). Storage at > 5 °C (41 °F) and exposure to ethylene can accelerate this problem.

Postharvest Pathology: Due to their high respiration rate, the heat generated by unrefrigerated peas will promote decay. Blemishes that reduce quality can be caused by: Alternaria blight due to *Alternaria alternata*; Anthracnose due to *Colletotrichum*; Ascochyta Pod Spot caused by *Ascochyta pisi* Lib; and Powdery Mildew due to *Erysiphe* spp. (Snowden, 1991). Common diseases for edible podded peas are: Gray Mold (*Botrytis cinerea*); Watery Soft Rot (*Sclerotinia sclerotiotorum*); Rhizopus rot; and Bacterial Soft Rot. Botrytis Gray Mold can be a problem at the blossom-end of fresh-cut pods.

Quarantine Issues: None known.

Suitability as Fresh-cut Product: Edible podded peas are suitable for use in fresh-cut mixtures.

Special Considerations: Keeping peas cold is critical for retaining quality. Surface moisture should be avoided unless the marketing chain is short and temperatures are kept < 2 °C (35.6 °F).

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